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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/853,661	05/14/2001	Masahiro Tanaka	208546US2	6508

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EXAMINER
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DIAZ, JOSE R

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 11/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/853,661

Applicant(s)

TANAKA, MASAHIRO

Examiner

José R Díaz

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 11 August 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-8 and 10-26 is/are pending in the application.
- 4a) Of the above claim(s) 6-8, 10-15 and 19-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5 and 16-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 4-5, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinzer (US Pat. No. 5,808,345).

Regarding claim 1, Kinzer teaches a semiconductor device (see fig. 4) comprising: a first conductivity type semiconductor substrate (63) (see fig. 4); a second conductivity type impurity layer (62) formed in one surface of the semiconductor substrate (63) (see fig. 4); a second conductivity type contact layer (61) formed in the impurity layer (62) (see fig. 4), the contact layer (61) being thinner than the impurity layer (62) (see fig. 4) and having a higher impurity concentration (P+) than the impurity layer (P-) (see fig. 4); a first electrode (101) formed on the contact layer (61) (see fig. 4); and a second electrode (102, 104) formed at another surface of the semiconductor substrate (63) for allowing a current to flow between the first (101) and second electrode (102, 104) (see fig. 4).

However, Kinzer is silent with respect to the thickness of the second conductivity type impurity layer (62) and the second conductivity type contact layer (61). It would have been obvious to one of ordinary skill in the art to form the second conductivity type impurity layer having a thickness of, for example, 1.0  $\mu\text{m}$  or less, and to form the second

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conductivity type contact layer having a thickness of, for example, 0.2  $\mu\text{m}$  or less, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Huang*, 40 USPQ2d 1685,1688(Fed. Cir. 1996) citing *In re Aller*, 105 USPQ 233., 235 (CCPA 1955).

Regarding claims 2 and 17, the recitation that “the impurity layer is provided for carrier injection from the impurity layer to the semiconductor substrate, and the contact layer is provided for reducing a contact resistant between the first electrode and the impurity layer and not for carrier injection”, emphasis added, has not been given patentable weight because it has been held that mere recitation of a newly discovered function or property, inherently possessed by things in prior art, does not cause claim drawn to those things to distinguish over prior art. *In re Swinehart* [169 USPQ 226 ] (CCPA 1971).

Regarding claim 4, Kinzer teaches an IGBT device (see fig. 4, and col. 4, lines 20-21).

Regarding claims 5 and 18, Kinzer teaches that the impurity layer (62) is formed in the entire one surface of the semiconductor substrate (63) (see Fig. 4).

Regarding claim 16, Kinzer teaches a semiconductor device (see fig. 4) comprising: a first conductivity type semiconductor substrate (63) (see fig. 4); a second conductivity type base region (75) (see fig. 4); a first conductivity type impurity region (77) formed in the base region (see fig. 4); a first electrode (104) connected to the first conductivity-type impurity region (77) (see fig. 4); a gate electrode ( $G_2$ ) connected to the

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base region (75) via an insulation film (82) (see fig. 4); a second conductivity type impurity layer (62) (see fig. 4); a second conductivity type contact layer (61) formed in the impurity layer (62) (see fig. 4), the contact layer (61) being thinner than the impurity layer (62) (see fig. 4) and having a higher impurity concentration (P+) than the impurity layer (P-) (see fig. 4); and a second electrode (101) (see fig. 4).

However, Kinzer is silent with respect to the thickness of the second conductivity type impurity layer (62) and the second conductivity type contact layer (61). It would have been obvious to one of ordinary skill in the art to form the second conductivity type impurity layer having a thickness of, for example, 1.0  $\mu\text{m}$  or less, and to form the second conductivity type contact layer having a thickness of, for example, 0.2  $\mu\text{m}$  or less, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Huang*, 40 USPQ2d 1685,1688(Fed. Cir. 1996) citing *In re Aller*, 105 USPQ 233., 235 (CCPA 1955).

### ***Response to Arguments***

3. Applicant's arguments with respect to claims 1-2, 4-5, and 16-18 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references teach the formation of a buffer layer

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between the drain electrode and the substrate: Nakagawa et al. (US Pat. No. 5, 985,708), see layers 44, 46 and 47 in figs. 12 and 15; Yilmaz et al. (US Pat. No. 5,136,349), see layers 64, 62 and 60 in fig. 3A; Laska et al. (US Pat. No. 6,309,920 B1), see layers 3, 10, 7 in fig. 1; and Francis et al. (US Pat. No. 6,482,681 B1), see layers 20 and 30 in fig. 4.

### ***Correspondence***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R Díaz whose telephone number is (703) 308-6078. The examiner can normally be reached on 9:00-5:00 Monday, Tuesday, Thursday and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

  
**GEORGE ECKERT**  
**PRIMARY EXAMINER**

JRD